UCRSF
2.8.2.3-3
9/10/12

Teck American Incorporated
501 N Riverpoint Blvd., Suite 300
Spokane, WA 99202
PO Box 3087
Spokane, WA 99220-3087

+1 509 747-6111 Tel
+1 509 922-8767 Fax
www.teck.com

Teck

September 10, 2012

File No.: 01-773180-000

Dr. Laura C. Buelow
Project Manager, Hanford/INL Project Office
U.S. Environmental Protection Agency, Region 10
309 Bradley Boulevard, Suite 300
Richland, WA 99352

VIA ELECTRONIC AND CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Subject: **NOTICE OF DISPUTE**
Upper Columbia River Remedial Investigation Feasibility Study - Response to U.S. Environmental Protection Agency Comments on the *Draft Final Quality Assurance Project Plan for the Phase 2 Sediment Study* (July 2012)

Dear Dr. Buelow:

On August 27, 2012, Teck American Incorporated (TAI) received correspondence from the U.S. Environmental Protection Agency (EPA) instructing TAI to "fully and completely" incorporate EPA's comments on the July 2012 Draft Final Quality Assurance Project Plan for the Phase 2 Sediment Study (herein referred to as the "Phase 2 Sediment Study") or "invoke dispute resolution." Please allow this letter, with the attached specific objections, to serve as TAI's written notice of dispute of that requirement pursuant to Paragraph 31 of the Settlement Agreement, dated June 2, 2006. TAI is **disputing** EPA **Specific Comments (SCs) -11, -12, -28, -29, -30,** and **-38** in their entirety or portions thereof.

TAI recognizes that a follow on Technical Review may be necessary pursuant to Paragraph 32 of the Settlement Agreement should these matters not be resolved, as the required action(s) and their potential effects on the reliability of the Remedial Investigation Feasibility Study (RI/FS) process are material and substantial, the required actions are not required for consistency with the National Contingency Plan, and are outside of the Scope of Work as defined and governed by the Settlement Agreement.

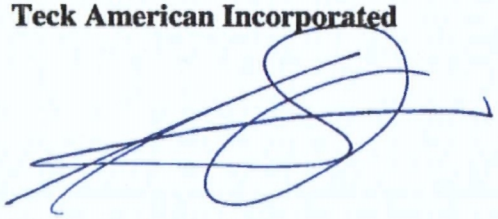
Beyond the specific comments disputed, TAI has welcomed and will continue to welcome, comments that improve the technical quality and utility of documents (deliverables) generated for the Upper Columbia River (UCR) RI/FS. Therefore, consistent with Paragraph 33 of the Settlement Agreement, TAI will for those comments not under dispute update the draft final quality assurance project plan for the Phase 2 Sediment Study as outlined within the attached response to comments, and be made available to EPA no later than **September 26, 2012**.

Throughout the process of preparing for the Phase 2 Sediment Study, TAI has demonstrated complete commitment to ensuring a successful 2012 field sampling season. For instance, as outlined in TAI's July 3, 2012 letter to EPA, despite having technical concerns over the rationale offered by EPA for its additional sediment sampling locations, TAI agreed to move forward, under protest. This is a significant concession on TAI's part as: EPA failed to consider and address TAI's technical concerns; and the additional sampling requires a significant increase in resources as it nearly doubles the number of sampling locations. EPA's most recent direction on six comments, in their entirety or portions thereof, represent actions that TAI believes are a material and substantial departure from the Settlement Agreement and its associated Statement of Work, are inconsistent with the principles of risk-based analysis and EPA Guidance, and/or are not required for consistency with the National Contingency Plan.

Therefore, TAI disputes the direction, in its entirety or portions thereof, outlined within EPA **SCs -11, -12, -28, -29, -30,** and **-38** for the Phase 2 Sediment Study. Attached are TAI's written statements and objections, which provide an overview of the dispute and state the technical basis of TAI's position for each of the above-listed disputed specific comments.

TAI is hopeful that we are able to resolve these issues in the very near future so as to salvage the 2012 field sampling season. Should you have any questions or require any additional information at this time, please contact me directly as soon as possible.

Sincerely,
Teck American Incorporated



Marko E. Adzic, P.E.
Manager, Environmental Engineering

Attachments (1) *Teck American Incorporated's Responses to EPA's Specific Comments on the Upper Columbia River Draft Final Quality Assurance Project Plan for the Phase 2 Sediment Study (received from TAI July 2012)*

cc: Matt Wilkening - U.S. Environmental Protection Agency, Idaho Office, Boise, ID
Dennis Faulk - U.S. Environmental Protection Agency - Hanford/INL Project Office, Richland, WA *(electronically)*
Monica Tonel - U.S. Environmental Protection Agency, Seattle, WA *(electronically)*
Dr. Carrie Rickwood - Natural Resources Canada; Ottawa, ON, Canada *(electronically)*
Stephen Gluck – Foreign Affairs Canada; Ottawa, ON, Canada *(electronically)*

Teck American Incorporated's Responses to EPA's Specific Comments on the Upper Columbia River Draft Final Quality Assurance Project Plan for the Phase 2 Sediment Study (received from TAI July 2012).

1) **Overstating BLM**. Delete the last sentence in Section A7.5.1 suggesting that pore water measures of COPCs evaluated using BLM is superior to other lines of evidence. EPA will let the data show us whether or not the BLM is informative.

   "~~It is expected that this relationship will provide the strongest line of evidence to predict the degree of expected benthic invertebrate toxicity from field-collected sediment samples.~~"

   TAI Response: We wish to confirm that the edit will be made as requested.

2) **Speculation on SEM.** Revise the following statement from Section A7.5.1 (page A-14) as follows:

   "When used in conjunction with toxicity testing data, excess SEM and carbon normalized SEM ~~will~~ is expected to improve the statistical quality of the data, and lead to a more thorough understanding of the causes of observed toxicity."

   TAI Response: We wish to confirm that the edit will be made as requested.

3) **Reference Conditions**. Delete the last three bullets in description of bioassay reference criteria (Section B1.1; page B-2) and replace these with a single bullet stating "Survival and growth will meet the test acceptability criteria for control sediment (EPA 2000; ASTM 2012)". Also, remove sentence referring to RSET (2009) because the conditions below are not specifically identified by RSET as implied.

   TAI Response: We wish to confirm that the edit will be made as requested.

4) **Evaluating Toxicity**. Section A7.5.2 (page A-14 and A-15) of the QAPP describes an approach for evaluating sediment toxicity relative to control samples rather than reference samples only if statistically significant differences exist. This is not consistent with standard practices for evaluating sediment toxicity. Revise the text as follows:

   "As such, ~~bioassay data will first be categorized as exhibiting significant adverse responses (e.g., significant effects when compared to laboratory control results) or negative responses (e.g., effects statistically indistinguishable from controls, or having lower mortality, greater biomass, etc. in treatment groups as compared to laboratory controls).(e.g., significant effects when compared to laboratory control results) or negative responses (e.g., effects statistically indistinguishable from controls, or having lower mortality, greater biomass, etc. in treatment groups as compared to laboratory controls)~~ a variety of methods will be used to evaluate these data. Samples that exhibit ~~significant~~ adverse responses relative to reference samples ~~as compared to laboratory controls~~ will ~~then~~ be ~~compared to reference samples~~ further evaluated to determine if the responses are related to COPCs. Additional detail regarding the consideration and selection of reference sites is discussed in Section B1.1 of this document. ~~Bioassay data will be analyzed via analysis of variance (ANOVA) to determine whether the variability in responses among reference locations (whether internal or external) differs significantly from that of Site samples.~~ A reference envelope approach (e.g., Hunt et al. 2001) will also be applied to the data, where reference site responses will be used to develop a response distribution and select a lower tolerance limit (e.g., generally the 5th percentile) to evaluate Site responses. Site samples with responses (e.g., survival or biomass) below the tolerance limit would be considered a "positive" response."

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

"As such, a variety of methods will be used to evaluate these data. Samples that exhibit adverse responses relative to reference samples will be further evaluated to determine if the responses are related to COPCs. Additional detail regarding the consideration and selection of reference sites is discussed in Section B1.1 of this document. A reference envelope approach (e.g., Hunt et al. 2001) will also be applied to the data, where reference site responses will be used to develop a response distribution and select a lower tolerance limit (e.g., generally the 5th percentile) to evaluate Site responses. Site samples with responses (e.g., survival or biomass) below the tolerance limit would be considered a "positive" response."

Please note that comparing site sediments to control sediments is consistent with Guidance. As noted within USEPA (2000), "...the performance of test organisms in the negative control is used to judge the acceptability of a test, and either the negative control or reference sediment may be used to evaluate performance in the experimental treatments..."

5) **Duplicate v. Split Samples.** Samples collected to support data-quality indicators must clearly distinguish between field collected sample splits and duplicates. Duplicate samples originate from independent collections while splits are taken from a single homogeneous sample. Revise the text as follows to clarify these terms:

Section A7.6.2, page A-17: "Field ~~duplicates~~ split samples will be collected to assess the homogeneity of sediment samples collected in the field and the precision of the sampling process. Field ~~duplicates~~ splits will be prepared by collecting two aliquots of sample from the homogenized ~~sampling equipment~~ sediment and submitting them for analysis as separate samples. Field ~~duplicates~~ splits will be ~~collected~~ prepared from at least 10 percent of the sampling locations."

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

Section A7.6.2, page A-17: "Field split samples will be collected to assess the homogeneity of sediment samples collected in the field and the precision of the sampling process. Field splits will be prepared by collecting two aliquots of sample from the homogenized sediment and submitting them for analysis as separate samples. Field splits will be prepared from at least 10 percent of the sampling locations."

EPA Comment - Appendix A, Section 2.2.8, page A-14: Field ~~Duplicate~~ Split Samples (EPA). EPA field ~~duplicate~~ split samples will be collected by EPA representatives from no less than 15 percent of the sediment samples (i.e., 21 samples if sediment is successfully collected from all 140 target [or reserve] locations) for chemical analysis as part of EPA's QA/QC program. Each EPA field duplicate sample will contain not less than 200 grams and will be collected as splits of homogenized sediments.

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

> **Appendix A, Section 2.2.8, page A-14**: Field Split Samples (EPA). EPA field split samples will be collected by EPA representatives from no less than 15 percent of the sediment samples (i.e., 21 samples if sediment is successfully collected from all 140 target [or reserve] locations) for chemical analysis as part of EPA's QA/QC program. Each EPA field duplicate sample will contain not less than 200 grams and will be collected as splits of homogenized sediments.

EPA Comment - Appendix A, Table A-2: footnote b - Project field duplicate samples should be collected for 10 percent of all analytical sediment samples and submitted blind to the analytical laboratory. In addition, EPA ~~plicate~~ split sediment samples (containing at least 200 g) will be collected for 15 percent of all analytical samples.

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

> **Appendix A, Table A-2: footnote b** - Project field duplicate samples should be collected for 10 percent of all analytical sediment samples and submitted blind to the analytical laboratory. In addition, EPA split sediment samples (containing at least 200 g) will be collected for 15 percent of all analytical samples.

6) **TIEs**. Details describing TIE test procedures will be described in a technical memorandum, as stated in Section B1.4 (page B-7). Therefore, details on these procedures are not needed in this QAPP. Delete the text in Section B4.2.2 (page B-11) as follows:

~~"Finally, consistent with the outcome of the dispute between TAI and EPA on the Problem Formulation Expansion document (TAI 2011), tissues from the Hyalella toxicity tests run as part of an initial TIE evaluation (before the samples are manipulated to sequester specific contaminant groups) will be archived.~~

~~Based on the observed severity of the toxicity, it may be necessary to dilute sediments in a 100, 75, and 50 percent series. Physically comparable natural sediment (from reference locations) will be used if a dilution is deemed necessary, and the mixture allowed to equilibrate for a week in the dark at 4°C. TIE bioassays are conducted in 100 mL beakers containing 30 mL of sediment and 60 mL of overlying laboratory water, using 5 to 8 replicates per sediment treatment."~~

TAI Response: We wish to confirm that the edit will be made as requested.

7) **Future Sampling**. Add the following text to the end of Section A7.1.2 (page A-7 and A-8) to explicitly state that EPA may require future sampling and that any future sampling will be data driven.

"Following Phase 2 sediment/toxicity data collection, analyses, and evaluation, if the U.S. Environmental Protection Agency determines that there is insufficient information to support an informed risk-based management decision using existing site data, additional sediment/toxicity sample collection may be needed. The need for future sampling will be data driven and directed by EPA, if determined to be necessary."

TAI Response: We wish to confirm that the edit will be made as requested.

8) **Terminology**. Section A7.1.2 (page A-7), Section A7.3.2 (page A-11), and Section A7.4.3 (pages A-12 and A-13) TAI refers to the shorter-term chronic toxicity tests as "Round 1" and the longer-term chronic reproduction toxicity tests as "Round 2". Delete all references to "Round 1" and "Round 2" throughout the QAPP to eliminate confusion due to other uses of these terms on this project where Round 2 refers to tests requiring further field collection efforts.

TAI Response: We wish to confirm that the edit will be made as requested.

9) **Upstream Reference Samples**. EPA encourages TAI to identify and add two more reference sediment samples from a location between the Hugh-Keenleyside Dam and Castlegar (Section A.7.3.1, page A-9) if possible.

TAI Response: Comment acknowledged. We appreciate the suggestion but as EPA is aware, such efforts were made during the white sturgeon sediment sampling program; however the coarse river substrates present did not allow sediment collection within those areas.

10) **Sediment Toxicity Benchmarks.** Update sediment toxicity benchmarks for antimony, chromium, copper, iron, lead, manganese, and mercury from MacDonald et al. (2000) referenced in Table A7-3.

TAI Response: We wish to confirm that the edit will be made as requested.

---

11) **Appendix B.** Delete Appendix B (COPC Refinement) and references to this COPC refinement on pages Section A-5, page A-5; and, Section A7.5.1, page A-14. It is sufficient for the QAPP to state that "Consistent with EPA's direction, the list of COPCs for bulk sediment chemistry was expanded to include EPA's full target analyte list" (see footnote on page A-5).

TAI Response: EPA's conclusion that it is sufficient to simply state "Consistent with EPA's direction, the list of COPCs for bulk sediment chemistry was expanded to include EPA's full target analyte list" represents a material and substantial departure from the Settlement Agreement and associated Statement of Work as it is: (1) inconsistent with the principles of risk-based analysis and bioavailability, and (2) inconsistent with EPA Guidance (1997 and 2001a).

Consistent with TAI's July 3rd correspondence, TAI has agreed to expand the list of sediment analytes (i.e., to include the metals target analyte list) in support of the Phase 2 Sediment Study. It is TAI's position that it is not sufficient under the Settlement Agreement and associated Statement of Work that the document simply state that the list of chemicals of potential ecological concern for bulk sediment chemistry was established "consistent with EPA's direction."

Consistent with Guidance (USEPA 1997, 2001a) and principles of a tiered-approach set forth in the Statement of Work, the ecological risk assessment process allows for the refinement of assumptions and methods used in the Screening Level Ecological

Risk Assessment (SLERA) to focus and guide subsequent data collection activities. TAI included the "refinement analysis" presented in Appendix B to focus and guide the Phase 2 Sediment Study in support of the Baseline Ecological Risk Assessment. Without incorporating this, or a substitutive alternative analysis performed by EPA in support of its direction, there is no technical support in the document itself or elsewhere on the Administrative Record that supports the list of analytes in the Phase 2 Sediment Study. As a result, there would be a significant data gap within the Administrative Record as to why chemicals of interest identified within the SLERA were not evaluated as part of the Phase 2 Sediment Study. Specifically, the SLERA concluded that the following chemicals or analyte groups in sediments required further evaluation because they exceeded their respective screening ecotoxicity values for benthic invertebrates: metals, dioxins/furans, pesticides, and semi-volatile organic compounds. Without Appendix B, TAI is not aware of any supporting information which indicates that, of the above-listed analytes, only sediment metals data is needed to evaluate potential toxicity to benthic invertebrates.

TAI has acknowledged within the draft final QAPP that the analysis performed and presented within Appendix B is not a risk assessment and does evaluate chemicals in other site media (e.g., surface water, soils, aquatic tissue etc.). Rather, Appendix B presents the approach, rationale, and results of refining chemicals in sediment and associated pore water to focus Phase 2 sediment investigations. TAI also acknowledges that since drafting the Phase 2 Sediment Study QAPP, a significant volume of EPA-approved data has become available (e.g., beach sediment, fish tissue data, surface water etc.); and consistent with Guidance (USEPA 1997, 2001a) and principles of a tiered-approach set forth in the Statement of Work, can be used to refine the list of chemicals of potential ecological concern identified from the SLERA. Such an effort would not only facilitate and support the rationale for the proposed Phase 2 Sediment Study, but would also focus the overall RI/FS. Although TAI does not believe that this level of effort is required in support of the Phase 2 Sediment Study, TAI strongly believes that the data presented and analyzed within Appendix B is necessary to document and ensure that an obvious data gap has not been overlooked. Such technical support confirms that the Phase 2 Sediment Study is a data driven process, which has been developed to provide sufficient information for the baseline ecological risk assessment and to inform EPA's risk-based management decisions.

Therefore, EPA's proposed direction to delete the Appendix represents a material and substantial departure from the Settlement Agreement and associated Statement of Work as it is inconsistent with the principles of risk-based analysis and bioavailability, and inconsistent with EPA Guidance (1997 and 2001a). It is TAI's position that the suggested deletion is not a permissible requirement under the Settlement Agreement, and would result in a data gap not only in the document, but also in the Administrative Record. Should EPA decide that Appendix B needs to be expanded to include other EPA-approved RI/FS data (beach sediment, fish tissue,

surface water etc.), TAI wishes to confirm that such an evaluation would be completed.

12) **Appendix C.** Delete Appendix C (Sediment Bed Mapping) from the QAPP, along with the reference to it in Section A5 (page A-6). EPA does not consider this a final analysis necessary for the QAPP. If TAI continues to use this approach, EPA expects that TAI will update these maps based on information collected during Phase 2 sediment sampling and updated bathymetry data. TAI should also evaluate the current model's accuracy in predicting sediment chemical and physical properties based off of the actual Phase 2 results.

TAI Response: EPA's direction to delete Appendix C is a material and substantial departure from the Settlement Agreement as it is inconsistent with the principles of risk-based analysis, bioavailability, empirical testing, and field confirmation. Furthermore and as acknowledged on April 27, 2012, EPA employed the materials and data presented within Appendix C to identify and select EPA's alternate sediment sampling locations.

As stated by EPA on the 27th of April, "The proposed sampling emphasis was intended to be on locations predicted in TAI (2011) to have a high mPECQ, with a range of predicted TOC concentrations," where mPECQ = mean Probable Effects Concentration Quotient, and TOC = Total Organic Carbon. Therefore, without Appendix C, or a substitutive analysis as performed by EPA, there would be no technical support and rationale for the proposed alternate sediment sampling locations, and an integral component of the Phase 2 Sediment Study would no longer be data driven. Therefore, EPA's proposed direction represents a material and substantial departure from the Settlement Agreement and associated Statement of Work as it is inconsistent with the principles of risk-based analysis and bioavailability, empirical testing, and field confirmation. It is TAI's position that the suggested deletion is not a permissible requirement under the Settlement Agreement, and although not a "final analysis," Appendix C is necessary for a data driven QAPP.

At no point in time has TAI suggested that this Appendix was a "final analysis", and concurs with EPA that it should and will be updated with data collected from the Phase 2 Sediment Study, and other EPA-approved RI/FS data (e.g., beach sediment and white sturgeon sediment toxicity tests). As stated within the draft final QAPP, data presented and analyzed within Appendix C was used to focus and guide data collection activities (i.e., selection of sediment sampling locations); and was performed consistent with EPA's Level of Effort for Investigations Designed to Evaluate Risks of Contaminants to Benthic Invertebrate Communities in the Upper Columbia River (February 2010). Therefore TAI does not agree that Appendix C can be deleted as it provides the supporting background in the selection of sediment sampling locations. Without the information presented in Appendix C, or any other analyses as performed by EPA in support of their direction, there is a gap for the technical support and rationale; and an integral component of the Phase 2 Sediment Study (i.e., sample selection) would no longer be data driven.

Consistent with EPA's June 21, 2012 direction, TAI confirms that sediment bed maps presented within Appendix C will be updated with data collected from the Phase 2 Sediment Study, along with other EPA-approved RI/FS data (e.g., beach sediment and white sturgeon sediment toxicity tests). At that time should EPA have any additional suggestions that would improve our mutual understanding of the site, and help inform risk-based management decisions for the RI/FS, TAI would be pleased to incorporate such information into the sediment bed property maps. At this time, TAI is not aware that updated bathymetry data have been approved by EPA for use in the RI/FS.

---

13) **Approval Sheet.** Update the names of the USEPA project coordinators in the approval sheet and throughout the document. In addition, correct the spelling of Ginna Grepo-Grove.

TAI Response: We wish to confirm that the edit will be made as requested. We would like to point out that unless otherwise instructed Teck American Incorporated within identify both Dr. Laura C. Buelow and Matt Wilkening as EPA's project coordinators.

14) **Method References.** Refer to current ASTM methods. Appendix ~~F~~ G (pages 21-22, C-1, and C-3) refers to ASTM methods from the mid-1990s that are not current (e.g., ASTM E724, E729, E1218, E1391, E1367, E1706, E1688, E1611, E1391). For example, ASTM E1383 is no longer included as a current standard (it was replaced with ASTM E1706 in the mid-1990s). Moreover, ASTM E1706 provides guidance for short-term and long-term sediment toxicity testing with amphipods and midge and is not cited.

TAI Response: Appendix G contains the QA/QC manual from Pacific EcoRisk. We wish to confirm that, in response to a request from Teck American Incorporated, Pacific EcoRisk will update their manual to the current standards. They acknowledge that their manual is out of date, but note that in practice they follow the most recent published standards and procedures, as documented in their Standard Operating Procedures (SOPs), which will be included in the final document.

15) **Analysis and Methods**. Change the sample preparation column in Table A7-2 to indicate that "AA and acid digestion" will be used in the first list of dissolved TAL metals (i.e., in pore water samples).

TAI Response: We would like to thank the U.S. Environmental Protection Agency for pointing out an error in the above-referenced Table. The correct sample preparation protocol is EPA CLP (Contract Laboratory Program), not "AA". As a result, we wish to confirm that Table should and will be corrected to read as follows:

Sample Preparation, Protocol column = "EPA CLP"

Sample Preparation, Procedure column = "Acid Digestion"

16) **Analysis and Methods**. Change the quantitative analysis column in Table A7-2 to indicate that "ICP/AES" will be used for quantitative analysis rather than "ICP" in the second list of dissolved TAL metals (i.e., in pore water samples).

TAI Response: We wish to confirm that the edit will be made as requested.

17) **Analysis and Methods**. Change the second heading in Table A7-2 to "Sediment" rather than "total metals" and delete the word "Dissolved" prior to TAL metals in the list of sediment metals. "Dissolved" must also be deleted prior to listing calcium, iron, manganese, potassium, and sodium in the sediment analyses.

TAI Response: We wish to confirm that the edit will be made as requested.

18) **Analysis and Methods**. Change the sample preparation protocol for AVS/SEM to "USEPA 1991" rather than "NA" in Table A7-2.

USEPA (U.S. Environmental Protection Agency). 1991. Draft analytical methods for determination of acid volatile sulfides (AVS) in sediment. Office of Science and Technology. Washington, DC.

TAI Response: We wish to confirm that the edit will be made as requested.

19) **Analysis and Methods.** List the reporting limits for metals analyzed by USEPA method 6020A and USEPA Method 6010C in separate columns for each method and by media in Footnote B of Table A7-2.

TAI Response: We wish to confirm that the edit will be made as requested.

Conditions Related to Field Sampling

20) A Cultural Resources Working Group review of the proposed sample locations convened on August 7th approved sediment sampling within 150 feet of each approved sampling position. Add the following text to Appendix A, Section 2.2.2 describing the procedure for sediment collection within this approved area:

"The field team leader will assess the potential for successful sampling as the sampling vessel is positioned at the designated coordinates. The first sediment grab will be attempted at this location unless the field team leader, in consultation with EPA oversight personnel, determines through best professional judgment that sampling at the designated location coordinates is not likely to be successful (e.g., bedrock or large woody debris observed). If sampling at the designated coordinates is not likely to be successful, or if an initial sample collection attempt is unsuccessful, the boat may be repositioned at any location within 150 feet of the designated location coordinates where the field team leader, in consultation with EPA personnel, determines that sampling will be successful."

TAI Response: We would like to take this opportunity to thank the Cultural Resources Working Group for this additional flexibility and wish to confirm that the edit will be made as requested.

21) **Field assessment of slag content.** Describe what is meant by a "qualified person" (Appendix A, page A-10; Appendix A, SOP-3, page 9) for conducting visual assessments of slag in the field.

TAI Response: A qualified person is either a Washington State Licensed Geologist (LG) or an engineer/scientist who has received site-specific training in the following:

- Identification of sedimentary deposits of the Upper Columbia River basin
- Recognition of amorphous silica-rich glass
- Particle size and percentage estimation
- Soil/sediment classification systems
- Recording of observations

We wish to confirm that each sampling team will include at least one qualified person who will perform the geologic examination of sediment samples. We also wish to confirm that the above-mentioned definition will be incorporated into the final document.

22) **Porewater Analysis.** Add the following text to Appendix A (page A-8): "The lack of successful field pore water collection with an air stone is not justification for rejecting a sediment sample for toxicity testing."

TAI Response: We wish to confirm that the edit will be made as requested.

23) **Sample Acceptability.** The revised QAPP is inconsistent with EPA's comments on the Draft QAPP (general comment 4) in stating that grab samples, upon retrieval and without manipulation, should be classified as rejected if they contain <25 percent fines (Appendix A; Section 2.2.4, page A-7; SOP 3, Page 5). The intent of EPA's previous comment on this issue was for TAI to first remove large particles and/or press-sieve (5 mm) to achieve samples that are acceptable if at least 25% of sample contains grain sizes ≤2 mm). Revise Appendix A as follows (and in SOP-3 as necessary) to clarify that samples will not be rejected based on grain size prior to sieving.

TAI Response: We appreciate the additional explanation and clarification provided at this time and apologize for not correctly interpreting EPA's "intent".

EPA Direction: Delete "The sample contains >25 percent fines (i.e., ≤2 mm)" from the bulleted list of sample acceptance criteria in Appendix A (Section 2.2.4, page A-7).

TAI Response: We wish to confirm that the edit will be made as requested.

EPA Direction: Change the heading in Appendix A, Section 2.2.4 Sampling Methods (page A-10) from "Geological Examination" to "Geological Examination and Press-Sieving".

TAI Response: We wish to confirm that the edit will be made as requested.

EPA Direction: Add the following text to the end of second paragraph in Appendix A, Section 2.2.4 Sampling Methods (page A-10);) to: "A final determination will be made whether the press-sieved sample meets the requirement for >25% of the sample to be fine grained (i.e., <2 mm)."

TAI Response: We wish to confirm that the edit will be made as requested.

EPA Direction: Delete "..., least 25 percent fines [i.e., ≤2 mm] as described in SOP-3")" from the listed acceptance criteria in Appendix A, Section 2.2.5 (page A-11).

TAI Response: We wish to confirm that the edit will be made as requested.

EPA Direction: Clarify Step 8 in Appendix A, Section 2.2.5 (page A-12) as follows: "Samples rejected due to incorrect grabs as defined in Step 2 will not be processed for chemical analysis or toxicity testing." And delete the second paragraph of step 8.

TAI Response: We wish to confirm that the edit will be made as requested.

EPA Direction: Revise Step 9 in Appendix A, Section 2.2.5 (page A-12) as follows:

9. Evaluate and document sediment particle size ~~(at least 25 percent must be ≤2 mm)~~
    a. Remove large rocks and debris from sediments by hand containing mostly fine particles.
    b. Press sediment through a ~~5.6 to 6.35~~ 5 mm sieve ~~(sieve numbers 4 or 3)~~ if sediments contain large fractions of particles >2 mm. Do not use river water to wash sediments through sieve.
    c. Assess the sediment grain size (at least 25 percent must be ≤2 mm).

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

9. Evaluate and document sediment particle size
    a. Remove large rocks and debris from sediments by hand containing mostly fine particles.
    b. Press sediment through a 5 mm sieve if sediments contain large fractions of particles >2 mm. Do not use river water to wash sediments through sieve.
    c. Assess the sediment grain size (at least 25 percent must be ≤2 mm).

24) **Sieving.** 5 mm sieves and mesh material are available. Revise the QAPP as follows to clarify that a 5 mm sieve will be used to press sieve any sediment samples that, based on the guidance provided by USEPA, require sieving to achieve the desired grain size distribution.

EPA Direction - Appendix A, Section 2.2.4 (page A-7): "Field personnel will use their experience and professional judgment to evaluate the relative volume of fine-grained sediments (i.e., ≤2 mm). A 5-mm sieve will be used to sieve any sediment samples that, based on the guidance provided by USEPA, require sieving to achieve the desired grain size distribution. If there is sufficient volume to perform sediment chemistry analyses..."

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

> Field personnel will use their experience and professional judgment to evaluate the relative volume of fine-grained sediments (i.e., ≤2 mm). A 5-mm sieve will be used to sieve any sediment samples that, based on the guidance provided by

EPA, require sieving to achieve the desired grain size distribution. If there is sufficient volume to perform sediment chemistry analyses..."

EPA Direction - Appendix A, Section 2.2.4 (page A-10): "A qualified person will characterize the sediment and visually estimate the percentage of the homogenized material that is ≤2 mm in size. All observations will be documented. Sediments that are composed entirely of fine grained material (≤2 mm) will be retained with no additional processing. Sediments that are composed mostly of fine grained materials but also include some larger pieces of gravel or debris will have the larger pieces of gravel or debris removed by hand. Samples with large proportions of materials that are >2 mm will be coarsely sieved using a ~~number 4 or 3 sieve (5.6 to 6.35 mm)~~ 5 mm sieve. Sieving will be performed by shaking or pressing (e.g., using gloved hands to break apart clumps) the sediment through the sieve. Unacceptable sieving techniques include drying the sediment or washing it through the sieve using water."

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

> A qualified person will characterize the sediment and visually estimate the percentage of the homogenized material that is ≤2 mm in size. All observations will be documented. Sediments that are composed entirely of fine grained material (≤2 mm) will be retained with no additional processing. Sediments that are composed mostly of fine grained materials but also include some larger pieces of gravel or debris will have the larger pieces of gravel or debris removed by hand. Samples with large proportions of materials that are >2 mm will be coarsely sieved using a 5 mm sieve. Sieving will be performed by shaking or pressing (e.g., using gloved hands to break apart clumps) the sediment through the sieve. Unacceptable sieving techniques include drying the sediment or washing it through the sieve using water.

EPA Direction - Appendix A, SOP-3 (page 9): "Samples with large proportions of materials that are >2 mm will be coarsely sieved using a ~~number 4 or 3 sieve (5.6 to 6.35 mm)~~ 5 mm sieve."

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

> Samples with large proportions of materials that are >2 mm will be coarsely sieved using a 5 mm sieve.

25) **Sediment Homogenization**. It is unclear why TAI is deviating from past practices for homogenizing large volumes of sediment in the field using shovels and spoons when methods acceptable to EPA (i.e., motorized cement mixer) were developed by TAI as part of sturgeon toxicity testing in 2010. Revise methods for sample homogenization to be consistent with effectiveness achievable by mechanical devices that are able to mix large sample volumes.

TAI Response: It is important to remember that a significant volume of sediment (i.e., 50 gallons [190 liters]) was required/collected for the 2010 white sturgeon

sediment toxicity program, while this program is proposing to collect a fraction of that volume. Nevertheless we appreciate EPA's comment and will edit the document to specify that a "mechanical stainless paddle wheel mixer" will be used to homogenize the sediment sample.

26) **Sediment Homogenization** Clarify that 10 percent of homogenized sediments will have splits collected to determine the precision of the sampling process as follows:

Section A7.6.2, page A-17: "Field ~~duplicates~~ split samples will be collected to assess the homogeneity of sediment samples collected in the field and the precision of the sampling process. Field ~~duplicates~~ splits will be prepared by collecting two aliquots of sample from the homogenized ~~sampling equipment~~ sediment and submitting them for analysis as separate samples. Field ~~duplicates~~ splits will be ~~collected~~ prepared from at least 10 percent of the sampling locations."

TAI Response: We wish to confirm that the edit will be made as requested. The resulting text will read as follows:

> Field split samples will be collected to assess the homogeneity of sediment samples collected in the field and the precision of the sampling process. Field splits will be prepared by collecting two aliquots of sample from the homogenized sediment and submitting them for analysis as separate samples. Field splits will be prepared from at least 10 percent of the sampling locations.

27) **Field lab.** EPA recommends that TAI plan to use a land-based field lab that would receive, homogenize, split, store, and ship the sediment samples that are collected in the field.

TAI Response: We appreciate EPA's recommendation and wish to confirm that a land-based field station (including a refrigerated truck) has already been factored into TAI's field program. This station will receive, store, and ship the sediment samples that are collected and homogenized in the field (on the boats).

---

28) **Split sediment samples to DOI**. Add the following text as a new bullet in Section 2.2.8 of Appendix A (page A-14):

"**Field Duplicate Samples (DOI).** DOI field split samples will be collected by DOI representatives from all bioassay samples for bioassay oversight as part of EPA's QA/QC program. Each DOI field split sample will contain not less than 7.5 liters (10.5 liters if available) and will be collected as splits of homogenized sediments." An EPA approved QAPP for these sediment sediments will be made available to Teck.

TAI Response: EPA's direction to include the above-mentioned text represents a material and substantial departure from the Settlement Agreement and associated Statement of Work (SOW) that is not consistent with EPA Guidance, is not required for consistency with the National Contingency Plan (NCP), and is not required to complete the Remedial Investigation/Feasibility Study (RI/FS). Although the above-suggested text identifies this work as being part of "EPA's QA/QC program", the

DOI draft quality assurance project plan (QAPP) entitled "*Confirmation of the Chemistry of Upper Columbia River Sediments and Associated Toxicity to Benthic Invertebrates, Version 1.7*" as prepared for the EPA and its authorized representative (in this instance DOI) does not support this assertion.

That draft QAPP clearly states that "**the resultant data will be used, either alone or in conjunction with data collected by TAI or data from other sources, to assess risks to benthic invertebrates at the site and to support any risk management actions that may be taken at the site,**" (see page 58 of 71, line numbers 1649 to 1651). Thus, while the proposed split sample analysis is characterized as a measure of Quality Assurance/Quality Control (QA/QC) related to the RI/FS, the actual intent is to use the split samples to conduct either: (1) an unnecessary duplicate study; or (2) an unrelated secondary study. Neither type of potential study is called for under the EPA-approved RI/FS Work Plan or under the Settlement Agreement nor the SOW. Furthermore EPA's proposed edits intrinsically link approval of the Phase 2 Sediment Study to TAI's agreement to provide such split-samples to DOI. This is neither appropriate nor acceptable.

It is TAI's position that inclusion of such work is a material and substantial departure from the criteria set forth in the Settlement Agreement for RI/FS actions as well as from the SOW. Furthermore, such a duplicative effort is inconsistent with EPA Guidance and is not required for consistency with the NCP. These points are further discussed below.

A. Inconsistency with the SOW and EPA Guidance

TAI does not contest that valid and appropriate split samples are a necessary and integral component of the RI/FS, so as to ensure collection of high quality data to inform EPA's risk-based management decisions. This was identified and acknowledged on June 21, 2012, when EPA stated that it would require a split of 15 percent of the samples for chemical analysis as part of the EPA QA/QC program. Consistent with the terms and conditions of the Settlement Agreement and field sampling programs completed to date for the RI/FS (e.g., Beach Sediment Study – Split Sample Analysis), TAI has confirmed that it will continue to "allow EPA or its authorized representatives to take split and/or duplicate samples," for such QA/QC purposes. The proposed DOI-splits however represent a material and significant departure from QA/QC oversight (Guidance) requirements where split samples are requested for chemistry analyses, and the frequency of split samples requested rarely exceeds 15 percent.

A review of quality planning documents and reports of National and Regional programs developed by EPA (1992, 1994, 2001b, 2004, 2009) was performed (1) to identify the frequency at which split samples are taken for "confirmatory toxicity testing", and (2) to determine what, if any, data quality objectives or measurement quality objectives are applied to specify the required (or achievable)

sediment toxicity test precision or accuracy. No standards were identified that would justify the proposed deviation from EPA's Superfund standard practice. The most salient statement on the issue of toxicity testing is provided within the EPA Environmental Monitoring and Assessment Program (2001b): which states "... accuracy measurements are not possible for toxicity testing... because 'true' or expected values do not exist for these measurement parameters." In short, not only is the proposed requirement for DOI splits a material and substantial departure of the Settlement Agreement and SOW, but it would represent an unprecedented departure of EPA National and Regional program and Superfund Guidance regarding the procedures for assurance of accuracy in toxicity testing.

Furthermore, given that EPA has stated it will require and collect a split of 15 percent of the samples for chemical analysis for QA/QC purposes, it offers no basis for the necessity for yet a third party (e.g., DOI) to "conduct confirmatory chemical analyses... with splits of sediment samples," in this case at a frequency of 100 percent.

Not only would this represent an unnecessary commitment of substantial resources, but because the draft DOI QAPP does not employ the same analytical extraction and/or analysis as TAI's draft final QAPP, and does not address decision rules for comparability of analytical results (e.g., Relative Percent Difference), the proposed DOI QAPP does not conform to EPA's QA/QC program and is inconsistent with Guidance. Similar disparities exist for the proposed split sample bioassays. Examples of such disparities in bioassay testing procedures include but are not limited to:

- Number of replicates: EPA (2000) recommends using eight replicates for routine testing as reducing replication reduces statistical power. DOI proposes to reduce the number of test replicates from the recommended eight to four.
- Overlying water quality: TAI's draft final QAPP identifies a Modified SAM-5 using 0.4 mg/L bromide; while DOI identifies specifications for well water. During preparation of TAI's draft final QAPP, EPA and DOI representatives expressed concern that the use of different waters could result in changes in contaminant bioavailability. This concern is equally valid with respect to comparability between overlying water employed by TAI's EPA-approved bioassay laboratory (Pacific EcoRisk), and DOI's proposed laboratory (Columbia Environmental Research Center, [CERC]). If comparability is desired then CERC must employ the same overlying water as Pacific EcoRisk. It is our understanding that Natural Resources Canada has also identified this as a potential concern (letter from Dr. Carrie Rickwood dated September 7, 2012).

- Test Acceptability Criteria (TAC): DOI's laboratory proposes to use a starting mean dry weight of about 0.02 to 0.035 mg/individual, and a Day 28 dry weight of about 0.4 mg/individual for TAC neither of which are part of the standard test method (USEPA 2000). Establishing test initiation weight TAC is not a method requirement and is cause for concern as different *Hyalella* phenotypes (i.e., lab cultures) may be larger at Day 7 than others. DOI's proposed laboratory (CERC) has established a weight range for their *Hyalella*, and it is not appropriate to use as TAC for other laboratories. Similarly, the dry weight TAC at test termination is not a method requirement and is what CERC has seen in their laboratory, without National round-robin testing using multiple culture sources and laboratories to verify their findings.

The above-listed disparities between the Phase 2 Sediment Study and DOI bioassay test procedures illustrate the fact that the proposed DOI program does not conform to the purported purpose, and has clearly not been developed to evaluate the precision or comparability of results, or laboratory (analytical and/or bioassay) performance. Rather, and as acknowledged within the document itself "the resultant data will be used, either alone or in conjunction with data collected by TAI or data from other sources, to assess risks to benthic invertebrates at the site and to support any risk management actions that may be taken at the site." Such a duplicative study will only serve to introduce uncertainty and ambiguity in the RI/FS.

Indeed, even if bioassay testing disparities were corrected by DOI's laboratory, such analyses of split samples are not appropriate for "confirmatory toxicity testing" because "...accuracy measurements are not possible for toxicity testing...because 'true' or expected values do not exist for these measurement parameters" (USEPA 2001b). Therefore not only is this Work a material and substantial departure of the Settlement Agreement and SOW, but it represents an unprecedented departure from any EPA Superfund National and Regional program and Guidance.

B. Inconsistency with the National Contingency Plan

References to "quality", "quality assurance", "quality control", "QA" and "QC" within the NCP were reviewed for requirements regarding toxicity testing, confirmatory testing, sample splitting, and the use of referee laboratories. There is no mention of sample splitting in the NCP, nor is there any mention of confirmation in a second laboratory, with the exception of a protocol for testing dispersant toxicity for application in oil spills. References to quality, quality assurance, quality control, QA and QC within the NCP are as follows:

Section 300.5 Definitions:

Quality assurance project plan (QAPP) is a written document, associated with all remedial site sampling activities, which presents in specific terms the organization (where applicable), objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives of a specific project(s) or continuing operation(s). The QAPP is prepared for each specific project or continuing operation (or group of similar projects or continuing operations). The QAPP will be prepared by the responsible program office, regional office, laboratory, contractor, recipient of an assistance agreement, or other organization. For an enforcement action, potentially responsible parties may prepare a QAPP subject to lead agency approval.

Section 300.415, 4(ii):

If environmental samples are to be collected, the lead agency shall develop sampling and analysis plans that shall provide a process for obtaining data of sufficient quality and quantity to satisfy data needs. Sampling and analysis plans shall be reviewed and approved by EPA. The sampling and analysis plans shall consist of two parts:

(A) The field sampling plan, which describes the number, type, and location of samples and the type of analyses; and

(B) The quality assurance project plan, which describes policy, organization, and functional activities and the data quality objectives and measures necessary to achieve adequate data for use in planning and documenting the removal action.

As indicated above, the NCP makes no mention of split sample bioassays. Therefore, TAI's position is that the request is not required for consistency with the NCP and represents a material and substantial departure from the Settlement Agreement and associated SOW.

Due to the uncertainty and ambiguity that would be associated with the incorporating the results of the proposed duplicate/secondary study, it is TAI's position that inclusion of such work is a material and substantial departure from the criteria set forth in the Settlement Agreement for RI/FS actions as well as it is: (1) a material and substantial departure from the SOW and its conformance with EPA Guidance, and (2) is not required for consistency with the NCP. At best, it represents an expensive duplicative effort unnecessary for the RI/FS.

In addition to the above-listed deficiencies, TAI notes that the DOI split sample analysis is a newly hatched request based on review of EPA's description of anticipated costs for the 2012 Fiscal Year (FY). While laboratory costs ($25,000) for split sediment samples were identified within EPA's costs for the 2012 FY, the proposed DOI split samples were not identified. Furthermore, such a duplicate/parallel study was not identified within

EPA's Level of Effort for Investigations Designed to Evaluate Risks of Contaminants to Benthic Invertebrate Communities in the Upper Columbia River (February 2010). This is not a trivial issue. Based on the proposed scope of work as outlined within DOI's draft QAPP, it is estimated that costs associated with the purported QA/QC program would be in excess of $500,000. No such costs were contemplated by EPA for the FY 2012 and their inclusion now would represent a material and substantial decision that is inconsistent with the Settlement Agreement and SOW, and is not required for consistency with the NCP.

TAI would also like to point out that Don MacDonald of MacDonald Environmental Services Ltd. is identified as a contract personal for the proposed bioassay split program. To the best of our knowledge, Mr. MacDonald was removed from the RI/FS project as EPA's contractor or representative in 2010. Therefore, if the proposed split bioassay program is truly intended for EPA's QA/QC program, it would not be appropriate to identify Mr. MacDonald as a contractor. Furthermore, it is TAI's understanding that both Mr. MacDonald and Mark Curry have been identified as lead technical investigators in the separate natural resource damage assessment for the Upper Columbia River Natural Resource Trustee Council.

It is also important to note that because reference samples will be collected in Canada, TAI does not believe that it is appropriate for EPA to tie the DOI sampling to TAI's QAPP and its approval. We wish to confirm that TAI has received confirmation from the Government of Canada that sampling as specified within TAI's draft final document is permissible, but that approval would not include the proposed DOI split samples. In addition, TAI understands that in a letter dated September 7, 2012 Natural Resources Canada has raised its own concerns regarding the proposed DOI split sample analysis.

Summary

Due to the high level of uncertainty and ambiguity that would be associated with results of the proposed DOI split sample study, it is TAI's position that inclusion of such work is a material and substantial departure from the criteria set forth in the Settlement Agreement for RI/FS actions that does not: conform to EPA Guidance or the principles of risk-based assessment, bioavailability, empirical testing and field confirmation on which this RI/FS is to be based; and is not required for consistency with the NCP. Therefore, it is TAI's position that the Study is not a permissible requirement under the Settlement Agreement.

TAI would like to reiterate that it agrees that valid and appropriate split samples are a necessary and integral component of the RI/FS, so as to ensure the collection of high quality data to inform EPA's risk-based management decisions. As a result, TAI fully supports EPA's requirement for a split of 15 percent of the samples for chemical analysis as part of the EPA QA/QC program. In addition, regardless of the fact that EPA has approved use of the bioassay laboratory (Pacific EcoRisk), should EPA require additional QA/QC assurances regarding Pacific EcoRisk's performance, perhaps EPA would

consider performing toxicity tests on the negative controls at their Environmental Effects Research Laboratory in Duluth Minnesota.

29) **Decision criteria for collecting sediment**. Revise the sample volume-based prioritization presented in Table A2 (Appendix A). First, the 12 gallons (45 liters) listed as a minimum sample volume for bioassays must be divided into separate volumes for short-term bioassays, long-term bioassays, TIE, and archive volumes to aid in sample volume prioritization since the bioassays have a higher priority than TIEs. EPA has determined that because TIE treatments have never been reported for longer-term reproductive toxicity tests these TIE longer-term tests will not be needed. Sample volumes for shorter-term TIEs are desirable, but not necessary for successful sampling at a location. With this in mind the EPA has determined the sample volumes needed for successful sampling and testing are as follows (use these to modify Table A2).

- The minimum sample volume for a successful collection at a bioassay station is 31 liters to be split as follows:
  - 23.5 liters for TAI (chemistry, short-term and long-term toxicity testing)
  - 7.5 liters for DOI
- If a minimum of 31 liters is not achieved then the sample will be set aside as a possible reserve station if needed for a chemistry-only station.
- If a minimum of 44 liters is available at a bioassay station the sample will be split as follows:
  - 23.5 liters for TAI (chemistry, short-term and long-term toxicity)
  - 10.5 liters for DOI
- If 44-61 liters is available the sample will be split as follows to allow complete testing by Teck and DOI
  - Up to 50.5 liters for Teck (chemistry, short-term and long-term toxicity testing, and TIEs)
  - 10.5 liters for DOI
- Final selection of which samples will be used for bioassays will be made in consultation with EPA and could potentially be made at the end of sampling based on the available sample volumes if primary and reserve station sediment volumes are insufficient.

TAI Response: We appreciate EPA's efforts in providing the above-listed volume calculations as it confirms that TAI is proposing to collect a sufficient volume of sediment to perform the tests (other than the proposed DOI split samples) outlined within the draft final QAPP (July 2012). However consistent with TAI's response to Specific Comment # 28 above, no modifications will be made to the final document in response to this comment as it is TAI's position that inclusion of the proposed DOI work is a material and substantial departure from the criteria set forth in the Settlement Agreement for RI/FS actions as it does not: conform to EPA Guidance, and is not required for consistency with the NCP. Therefore, it is TAI's position that the Study is not a permissible requirement under the Settlement Agreement.

30) **Minimum acceptable sampling success rate.** Reword as follows (Section A7.6.1, page A-16): As demonstrated by previous sampling experience at the site (e.g., USEPA 2005), the percentage of successful collection of sediments cannot be determined *a priori* because of unforeseen challenges at some areas such as sample refusal due to bedrock and/or large

cobbles (i.e., sediments generally having particle diameters greater than 2 mm). Because a large number of backup stations are available to mitigate such potential challenges, the overall goal is to collect 100 percent of the targeted samples with sediments representing each of the sampling bins. To move to an alternate location the field sampling team will consult EPA or their designee as to the benefit of continuing to attempt to collect a sample at a site where minimal or no appropriately sized sediment is available. Final determination of study success will be made post hoc on the concentrations of sediment samples collected.

TAI Response: We appreciate EPA's suggested language and would like to take this opportunity to obtain clarification on two important aspects of the comment and suggested text.

Firstly, EPA has suggested language that may be misinterpreted relative to other portions of the quality assurance project plan where the required level of effort at all stations (including reserve stations) is three attempts prior to moving to the next designated station. We believe EPA's intent to be that if the first attempt at a station is unsuccessful, the field sampling crew in association with EPA or its designated representative are to identify the next sampling area within the 300 foot diameter circle (area = 942 ft^2) as approved by the Cultural Resources Working Group (refer to specific comment #20). If after three attempts a successful sample could not be retrieved the field sampling team would ensure that reserve stations as identified by EPA were visited accordingly. It would be greatly appreciated if EPA could confirm that we have correctly interpreted the intent of this sentence.

Secondly, EPA's direction to include the very last sentence which reads "Final determination of study success will be made post hoc on the concentrations of sediment samples collected." represents a material and substantial departure from the Settlement Agreement and associated Statement of Work (SOW), is not consistent with EPA Guidance, is not required for consistency with the National Contingency Plan (NCP), and is not required to complete the Remedial Investigation/Feasibility Study (RI/FS).

The suggested text implies that if a certain, yet to be determined sediment concentration is not obtained during the Phase 2 Sediment Study, additional sampling would be needed. This is not a data quality objective of the quality assurance project plan, nor is it goal or intent of the RI/FS. Consistent with EPA Guidance, the Settlement Agreement and SOW, the goal of the RI/FS is to determine if there are any unacceptable risks at the site. Consistent with the SOW, this study is intended to collect the data needed to characterize the composition of bulk and bioavailable sediments and porewater in terms of contaminant, particle size and physiochemical properties that affect metal and other contaminant's bioavailability and toxicity; and tied to the direct determination of sediment toxicity tests of benthic macroinvertebrates.

As acknowledged in specific comment #7 and consistent with EPA Guidance (USEPA 1997) if, following data collection, analyses, and evaluation, there is

insufficient information to support an informed risk-based management decision using existing site data, then additional data (e.g., sediment/toxicity sample collection) may be needed. Furthermore and per the terms and conditions of the Settlement Agreement, should TAI identify the need for additional data, this would be documented in a technical memorandum at that time. The proposed sampling locations were ones selected by EPA to which TAI has expressed technical concerns. Therefore, it is TAI's position that inclusion of the last sentence ("Final determination of study success will be made post hoc on the concentrations of sediment samples collected.") represents a material and substantial departure from the Settlement Agreement and associated SOW, is not consistent with EPA Guidance, is not required for consistency with the NCP, and is not required to complete the RI/FS. As a result, it is TAI's position that the last sentence is not a permissible requirement under the Settlement Agreement; and requests that the text be modified as follows:

> As demonstrated by previous sampling experience at the site (e.g., USEPA 2005), the percentage of successful collection of sediments cannot be determined a priori because of unforeseen challenges at some areas such as sample refusal due to bedrock and/or large cobbles (i.e., sediments generally having particle diameters greater than 2 mm). Because a large number of backup stations are available to mitigate such potential challenges, the overall goal is to collect 100 percent of the targeted samples with sediments representing each of the sampling bins. Before moving to an alternate location the field sampling team will consult EPA or their designee as to the benefit of continuing to attempt to collect a sample at a site where minimal or no appropriately sized sediment is available, consistent with the Field Sampling Plan (e.g., Section 2.2.4, 2.2.5, and SOP-3).

Laboratory Toxicity Testing – Both the required changes and suggested considerations below are to achieve better endpoints (survival, growth and reproduction) in the laboratory controls which improves confidence in the comparison of results from field samples. EPA would expect the same toxicity test performance standards to apply.

31) **Laboratory Collection of Pore Water Using Peepers.** EPA had invited USGS laboratory personnel to discuss methods for sampling and measuring pore water in peepers during laboratory toxicity tests with TAI and Pacific Ecorisk Lab (PER) and understands that Brumbaugh type peepers offer volume advantages over the Doig and Liber peepers proposed in the revised draft QAPP. Revise the methods for laboratory pore water collection and sample analyses in Section B4.2.1 (page B-10) to describe the Brumbaugh peepers in the lab tox tests. Include method details such as the type of membrane that will be used (add: "0.45-µm polyether sulfone"), and the expanded list of metals that will be analyzed (add: "TAL metals except for mercury").

TAI Response: We wish to confirm that the edit will be made as requested. We respectfully request that EPA provide a copy of the U.S. Geological Survey (USGS) standard operating procedure for inclusion into the final document.

32) **Laboratory Collection of Pore Water Using Centrifuged Sediment.** EPA has concerns over the air stone method/number of chemistry replicates needed to collect pore water with air stones. For example, TAI proposes compositing 300 ml of whole sediment from chemistry replicates collected during the toxicity tests to then extract up to 115 ml of pore water (Table B3-2) using an air stone for analysis of dissolved metals, DOC, pH, major cations and major anions. This procedure will not produce sufficient pore water if the sediment has less than 40% moisture content. Therefore, include the following text: "Pore water will be sampled from each sediment sample selected for short-term toxicity tests at the start of exposures using centrifugation. These pore water samples will be analyzed for DOC, pH, alkalinity, sulfide, major cations, and major anions to inform the BLM for interpreting toxicity data."

TAI Response: We wish to confirm that the edit will be made as requested.

33) **Bulk Chemistry for Long-term Toxicity Tests**. Revise Section B4.1 (page B-9). Insert: "Bulk sediment chemistry, porewater metals (from peepers), and BLM parameters (from centrifuged sediment) will be analyzed anew prior to longer-term reproduction toxicity tests."

TAI Response: We wish to confirm that the edit will be made as requested.

34) **AVS/SEM Measurement in Laboratory Exposures.** Revise Section B4.1 (page B-9) Insert: "AVS and SEM will be measured in at least one chemistry-only replicate per sample during sediment toxicity tests (including repeat measurements during long-term reproduction toxicity tests)."

TAI Response: Although the data quality objective has not been provided, we wish to confirm that the edit will be made as requested.

35) **Sediment Equilibration.** EPA encourages TAI in Section B4.2 (page B-10) to indicate that test sediments will be equilibrated in the exposure beakers for about 7 days under static conditions (not 1 day) before water addition on Day-1 and introduction of test organisms into the exposure beakers on Day 0 (e.g., Ingersoll et al. 2008) to better stabilize whole sediment under the test conditions.

TAI Response: Comment acknowledged. Pacific EcoRisk will perform the tests per standard industry practices and as such, no change is needed nor will be made to the document in response to this comment.

36) **Illuminance.** EPA is pleased to see that Section B4.2 currently states that light intensity will be monitored daily. Revise Tables B1-3 through B1-6 to state the anticipated light intensity that will be used for testing (rather than repeat the broad range of 100 to 1000 lux from USEPA (2000) and ASTM (2012). Add in Section A9.3 (page A-20) "The laboratory toxicity report will document the measured light intensity during testing ".

TAI Response: We wish to confirm that the edit will be made as requested.

37) **Overlying Water** – EPA is concerned that measuring water quality in thousands of replicate beakers daily could compromise data quality by increasing the possibility cross contamination

among exposures beakers or the accidental removal of organisms. Therefore EPA is requiring measurements in representative beakers, not in every replicate. In Section B4.2 (page B-10) add: "Water quality will be measured in the overlying water of representative replicate chambers for each sample according to EPA guidance."

TAI Response: We wish to confirm that the edit will be made as requested.

---

38) **Overlying water**. Change Tables B1-3 and B1-5 to indicate the modified concentration of bromide in the "Borgmann (1996)" reconstituted water will be 0.04 mg Br/L (not 0.4 mg Br/L), consistent with discussions with EPA and July 3rd and Mount et al. (2012).

TAI Response: Neither Teck American Incorporated nor Pacific EcoRisk are comfortable deviating from the procedures that Pacific Ecorisk currently follows for preparation of overlying water in toxicity tests, because they do not have sufficient in-house data to demonstrate that decreasing bromide concentrations to 0.04 mg/L will provide consistent and acceptable results. It is TAI's position that the best prospect for success for the project is offered by using Borgman SAM-5 water that has the 0.8 mg/L or 0.4 mg/L bromide addition given that Pacific Ecorisk has a proven record of great survival, growth, and reproduction of their organisms in these waters. They have modified their SOPs such that all testing for the project (for both *Hyalella* and *Chironomus* tests) can be performed using the same water. It is important to note that the use of Borgman SAM-5 reconstituted water with 0.8 mg/L or 0.4 mg/L bromide is absolutely compliant with the established EPA method; the use of different water (i.e., one with lower bromide concentrations) without well documented acceptable performance is 'research in progress'. Additional testing with 0.04 mg/L bromide in Borgman SAM-5 reconstituted water would need to be performed to assure consistent acceptable results. Furthermore, on July 27, 2012 EPA approved Pacific EcoRisk based on quality control data generated using overlying water with bromide concentrations of 0.4 mg/L bromide. Therefore, this change will not be made, and Pacific Ecorisk will use Borgman SAM-5 reconstituted water with 0.4 mg/L bromide. TAI understands that Natural Resources Canada has also identified this as a potential concern (letter from Dr. Carrie Rickwood dated September 7, 2012).

---

39) **Control Sediment.** Add in Section A9.3 (page A-20): "The laboratory toxicity report will document the source of control sediment and associated measurements."

TAI Response: We wish to confirm that the edit will be made as requested.

40) **Control Sediment**. To aid in data interpretation of the toxicity testing with amphipods and midge (see Mount 2011), EPA recommends including a negative control using quartz sand with each test batch in addition to the typical control sediment. The text and tables will need to be updated accordingly if TAI agrees with this recommendation.

TAI Response: We wish to confirm that the edit(s) will be made as requested. We do however respectfully request that EPA provide their definition of "quartz sand" as there are a number of varieties of "quartz sand".

41) **Test Organisms of Known age.** Add in Section A9.3 (page A-20): "The laboratory toxicity report will document how organisms of known age were obtained for testing."

TAI Response: We wish to confirm that the edit will be made as requested.

42) **Test Organism Size.** In Section A9.3 (page A-20) and Tables B1-3 through B1-6 (other than midge < 24-h old, if used) add: "The weight of a representative subsample of organisms at the start of sediment exposures will be documented."

TAI Response: We wish to confirm that the edit will be made as requested.

43) ***Hyalella* Feeding**. Change Tables B1-3 and B1-5 to indicate the *Hyalella* feeding conditions will be 1 mg YCT/day for the 1st two weeks of the sediment exposures (Day 0 to 13) and then 2 mg YCT/day for the remaining exposure (Day 14 to 27 for 28-day exposures and from Day 28 to 42 in the reproductive test) (Mount 2011).

TAI Response: We wish to confirm that the edit will be made as requested.

44) ***Hyalella* Weight.** Describe in part A of Tables B1-7 and B1-9 that *Hyalella* average starting weights will be targeted to be in the range of 0.02 to 0.035 mg/organism for 7-8 day old organisms.

TAI Response: The average initial weight of *Hyalella* used by Pacific EcoRisk during 2011 and 2012 (to date) is 0.054 mg/individual. These are "known-age" organisms of 7-8 days old, as specified by the published protocols (EPA 2000) and in EPA's comment above. Therefore, EPA has provided conflicting direction as both requirements (age and weight) cannot be met simultaneously. Teck American Incorporated will direct Pacific EcoRisk to follow guidance and use known aged (7-8 day old) organisms. We wish to acknowledge that we will modify the text in the document to state that the preferred target starting weigh will be in the range of 0.02 to 0.035 mg/organisms, as requested by EPA.

45) ***Hyalella* Weight.** State in part A of Tables B1-7 and B1-9, that the mean weight of control amphipods at Day 28 should be ≥0.4 mg dry/individual and at Day 42 (Table B1-9 only) should be ≥0.5 mg dry/individual.

TAI Response: We wish to confirm that the edit will be made as requested.

46) **Midge Feeding.** Consider revising Tables B1-4 and Table B1-6 to indicate that the diet of Tetrafin® will be introduced as particles rather than as a slurry in exposures conducted with *C. dilutus* (Mount 2011).

TAI Response: We wish to confirm that the edit will be made as requested.

47) **10-Day Midge Starting Weight.** Revise the test conditions in Tables B1-4 and B1-8 (Part A) to indicate that midge for the start of 10-day toxicity testing will be targeted to be ≤0.12 mg ash-free-dry weight (AFDW)/individual. EPA is concerned that midge used by PER in past testing (i.e., >0.3 mg) have started 10-day toxicity tests near the minimum test acceptability criteria for control growth at the end of the test (i.e., average of 0.48 mg AFDW) (Mount et al., 2012). The finding that PER organisms can be larger than desired for testing is supported by Section 12.3.4 of the EPA (2000) test guidance where it states "developmental stage should be documented .....can be determined from head capsule width (Table 10.2), length (4 to 6 mm), or dry weight (0.08 to 0.23 mg/individual)." EPA (2000) methods provide flexibility to start 10-day midge toxicity tests with "about 10 days old larvae" to allow for variability among growth rates among different midge cultures (D. Mount pers. comm. 2012). It is important to ensure that these organisms are not too large that the growth endpoint is compromised.

TAI Response: In order to be in compliance with current guidance that requires at least 50 percent third instars, while achieving smaller starting sizes, Pacific EcoRisk will maximize the number of second instars (up to 50 percent). We refer EPA to the May 9, 2012 correspondence documenting Pacific EcoRisk's response to questions about quality control issues. The mean ash-free-dry weight of *Chironomus* used by Pacific EcoRisk in their last 9 tests was 0.15 mg/organism at initiation and 0.79 mg/organism at termination (this was with randomly selected individuals, without striving to achieve 50 percent second instars). Therefore, we believe that Pacific EcoRisk's current procedures will meet the required scope-for-growth. We will edit the document to reflect the decision to start with 50 percent second instar larvae, with a goal of achieving starting average weight of 0.12 mg/organism.

48) **10-day Midge Toxicity Test Setup.** Consider revising Table B1-8 (Part C) to indicate that larval *C. dilutus* will be transferred from cultures to replicate exposure beakers at the start of the test while still in their cases (Mount 2011).

TAI Response: Pacific EcoRisk has had no excessive mortality transferring the *C. dilutus* that are out of their cases, and prefers to continue that practice. Therefore, this edit will not be made.

49) **Long-term Midge Toxicity Test Starting Age.** Recent studies conducted by USGS Columbia indicate that improved control survival and performance can be achieved by starting long-term midge reproduction tests with 4-day-old larvae rather than with 24-hour-old larvae. Therefore, EPA suggests that TAI consider using starting age of midge should be 4-day-old larvae for long-term testing and this should be reflected in Table B1-6. Doing so would require adjusting the daily schedule and Table B1-10 to account for test initiation with older individuals.

TAI Response: As documented in our May 9, 2012 correspondence to EPA, Pacific EcoRisk has acceptable survival and growth of control *C. dilutus* in sediment life cycle tests. For example, mean 20-day percent survival ranges from 83.3 to 98.0 percent in control sediments and is over 85 percent in silica control. Pacific EcoRisk believes survival is related to degree of aeration of sediments at the start of the test.

Therefore, because the recommendation by EPA is considered to be 'research in progress', this edit will not be made.

50) **Long-term Midge Toxicity Test Starting Age.** Correct inconsistencies in Section A7.3.2 (page A-11) describing an "adopted method starting with 7-day old larvae" for 50-65-day midge reproduction toxicity tests. EPA recommends use of 4-day old midge for the start of this long-term test. This recommendation is being made with EPA's recognition that the test guidance stated in Table B1-6 specifies the use of midge <24-hours old. Whichever midge starting age is chosen by Teck, it is imperative that all references to that starting age are updated consistently throughout the QAPP.

TAI Response: We wish to confirm that the edit will be made as requested.

51) **Test Acceptability for Midge.** Correct Section A.7.6.2 (page A-17) to state that the minimum acceptable control survival for midge is 70% (EPA 2000; ASTM 2012).

TAI Response: We wish to confirm that the edit will be made as requested.

52) **Ash Free Dry Weight.** Clarify in Section B1.3.1 (last bullet on page B-5 and the first bullet on page B-6) AFDW will only be determined as an endpoint for midge whereas dry weight (not AFDW) will be determined as the weight endpoint for *Hyalella*.

TAI Response: We wish to confirm that the edit will be made as requested.

53) **Reproduction Endpoints**. Update Section B1.3.1 (last bullet on page B-6) to include percent emergence and time to emergence endpoints for the long-term toxicity tests with midge in addition to referencing the endpoints listed in Table 15.4 of EPA (2000) that will be reported.

TAI Response: We wish to confirm that the edit will be made as requested.

54) **Replicate Sediment Toxicity Test Beakers.** Revise the descriptions of the number of replicate test beakers in the text and Tables B1-3 through B1-6, and Figures B4-2 and B4-3 to ensure consistency and correct as follows:
    - The number of chemistry replicates in Tables B1-3, B1-4, B1-5, and B1-6 must include accounting of both the toxicity and chemistry replicates.
    - The number of toxicity replicates in Figure B4-3 must be updated to include 4 auxiliary males for midge and 8 replicates sampled for Day 42 survival, weight and biomass.
    - Inconsistencies between Table B1-5 and Figure B4-2: The number of toxicity replicates in Figure B4-2 must be updated to be consistent with Table B1-5 for long-term amphipod testing (4 replicates for Day 28 survival and 8 replicates for Day 35 survival and reproduction and Day 42 survival, reproduction, and weight) rather than 4 replicates for Day 35 and Day 42 survival or reproduction). Delete the statement that more replicates might be needed for reproduction end point and simply state the specific number of replicates to be tested.
    - Inconsistencies between Table B1-6 and Figure B4-2: Table B1-6 for long-term midge testing states 16 replicates needed (included 4 auxiliary male replicate beakers). However, Figure B4-2 must be updated to also state 16 replicates for long-term midge testing (incorrectly states 12 replicates for the long-term midge testing).
    - Inconsistencies among Section B4-2 (page B-9), Tables B1-3 to B1-6 and Figures B4-1 and B4-2. Section B4.2 summarizing the number of replicates tested must be

consistent with Tables B1-3 to B1-6 and Figures B4-1 and B4-2 (e.g., 11, not 12 replicates for short-term midge exposures).

TAI Response: We wish to confirm that the edits will be made as requested.

55) **Replicate Sediment Toxicity Test Beakers.** Provide confirmation in Appendix F that it is within the capacity of the selected lab to conduct these tests with the large number of replicate chambers (i.e., ~1900) as will be required by the approved QAPP.

TAI Response: We wish to confirm that because the bioassay laboratory (Pacific EcoRisk) will be doing the tests in batches (i.e., not waiting until all samples are received), this comment is not applicable and no change is needed within the final document.

56) **Lab Toxicity SOPs and Daily Activity Schedules.** Include lab toxicity test SOPs with Appendix F of the QAPP and provide detailed daily activity schedules for the short-term and long-term toxicity tests conducted with amphipods and midge (see examples provided in USEPA 2000 and in ASTM 2012).

TAI Response: We wish to confirm that the edit will be made as requested.

Appendix D – Cultural Resources Coordination Plan

57) Delete Section 4.2.1.5 Discoveries-Archaeological Monitors Not Present. This paragraph/section does not apply since there will be archaeological monitors present.

TAI Response: We wish to confirm that the edit will be made as requested.

Attachment D1 - Lake Roosevelt Protocols for Native American Graves Protection and Repatriation Act (NAGPRA) Inadvertent Discoveries or Intentional Excavations: Confederated Tribes of the Colville Reservation, National Park Service, and the Bureau of Reclamation

58) Delete the last sentence of the 1st paragraph in Attachment D1 – Protocols for Inadvertent Discoveries stating "A Comprehensive Agreement incorporating the terms of this protocol is in draft and expected to be complete by the end of FY 2005."

TAI Response: We wish to confirm that the edit will be made as requested.

59) Replace Item 6 in Attachment D1 with the following:

- Guy Moura, CCT THPO and Program Manager of the CCT History/Archaeology Program is the primary contact for the CCT. Mr. Moura's phone number at the Program is (509) 634-2695 and email is guy.moura@colvilletribes.com. After hours, Mr. Moura can be contacted at (b)(6) (cell). If Mr. Moura cannot be reached, then Jon Meyer, Tribal Archaeologist is the alternate contact at (509) 634-2691 (office) or (b)(6) (cell) and at jon.meyer@colvilletribes.com. In the event that neither Mr. Moura or Mr. Meyer cannot be contacted, then Eric Oosahwee-Voss, CCT Archaeologist will be contacted at (509) 634-2690 (office) or (b)(6) (b)(6) (cell) and at eric.oosahwee-voss@colvilletribes.com. Mr. Meyer or Mr. Oosahwee-Voss shall participate in the NAGPRA consultation process on Mr. Moura's behalf until his return. Jackie Cook, Repatriation Specialist will also participate in the NAGPRA consultation process. Ms. Cook's contact information is

(509) 634-2635 (office) or (b)(6) (cell) and jackie.cook@colvilletribes.com. The CCT shall maintain a presence at the location of the discovery as needed until all contacts have been made and appropriate treatment of the NAGPRA items has been conducted.

- Ray DePuydt, Park Archeologist for the Lake Roosevelt National Recreation Area, is the primary contact for the NPS. Mr. DePuydt's phone number is (509) 738-6266, ext. 101 or (509) 631 4673, and his FAX is (509) 633-3862, and internet address is "ray_depuydt@nps.gov." If Mr. DePuydt cannot be contacted in person, then contact Ken Hyde at (509) 633-9441 ext 128.
- Michael Flowers, Power Office Archaeologist, is Reclamation's contact. His phone number is (509) 633-9507 [receptionist], FAX 633-9138, and internet address is "mflowers@usbr.gov." If Mike Flowers is not available, contact Sean Hess, Regional Archaeologist (208) 378-5316, FAX (208) 378-5305, and internet address is "shess@usbr.gov."

TAI Response: We wish to confirm that the above listed edits will be made as requested.

Attachment D1 - Protocols for NAGPRA Inadvertent Discoveries and Intentional Excavation on the Lake Roosevelt National Recreation Area: Spokane Tribe of Indians, National Park Service, and Bureau of Reclamation

60) Replace Item 5 in Attachment D1 with the following:

- Randy Abrahamson, STI THPO, is the primary contact for the STI. Mr. Abrahamson's phone number at the Department is (509) 258-4315, FAX (509) 258-6965, and his Internet address is randya@spokanetribe.com. After work hours, Mr. Abrahamson can generally be reached at (b)(6) (cell). If Mr. Abrahamson cannot be reached, John Matt (Preservation Department Director), James Harrison (Principal Investigator), or Brea Franco (Tribal Archaeologist) shall be contacted at (509) 258-4060. If none of the above people can be reached, then the on-site STI crew leader shall be presumed delegated as the primary STI representative and shall participate in the NAGPRA consultation process until Mr. Abrahamson's return. The STI shall maintain a presence at the location of the discovery as needed until all contacts have been made and appropriate treatment of the remains has been conducted.
- Michael Flowers, Power Office Archaeologist, is Reclamation's contact. His phone number is (509) 633-9507 [receptionist], FAX 633-9138, and internet address is "mflowers@usbr.gov." If Mike Flowers is not available, contact Sean Hess, Regional Archaeologist (208) 378-5316, FAX (208) 378-5305, and internet address is "shess@usbr.gov."
- Ray DePuydt, Park Archeologist for the Lake Roosevelt National Recreation Area, is the primary contact for the NPS. Mr. DePuydt's phone number is (509) 738-6266, ext. 101 or (509) 631 4673, and his FAX is (509) 633-3862, and internet address is "ray_depuydt@nps.gov." If Mr. DePuydt cannot be contacted in person, then contact Ken Hyde at (509) 633-9441 ext 128.
- Spokane Tribal Law Enforcement can be reached at 1-888-258-6899 and/or 258-7766, and NPS Chief Ranger Marty Huseman at (509) 633-9441, ext. 123. Ms. Huseman can be reached by cell at (b)(6) If she is not available, North

District Ranger Bryan Yetter's number is (509) 738-6266 ext. 162 or cell (b)(6) (b)(6)

TAI Response: We wish to confirm that the above listed edits will be made as requested.

REFERENCES

Schumacher, B.A. 1994. Project Summary, Assessment and Remediation of Contaminated Sediments (ARCS) Program--Quality Assurance Program Plan, Assessment and Remediation of Contaminated Sediments (ARCS) Program.

USEPA. 2009. National Coastal Condition Assessment Quality Assurance Project Plan 2008-2012. United States Environmental Protection Agency, Office of Water, Office of Wetlands, Oceans and Watersheds. Washington, D.C. EPA/841-R-09-004.

USEPA. 2007. *Framework for metals risk assessment.* EPA 120/R-07/001. Office of the Science Advisor, Risk Assessment Forum, Washington DC. March 2007.

USEPA. 2004. Wadeable Stream Assessment: Integrated Quality Assurance Project Plan. EPA/841/B-04/005. U.S. Environmental Protection Agency, Office of Water and Office of Research and Development, Washington, DC, (draft).

USEPA. 2001a. ECO Update: The role of screening-level risk assessments and refining contaminants of concern in baseline ecological risk assessments. EPA 540/F-01/014. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA. 2001b. Environmental Monitoring and Assessment Program (EMAP): National Coastal Assessment Quality Assurance Project Plan 2001-2004. United States Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA/620/R-01/002.

USEPA. 2000. Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, second edition. EPA 600/R-99/064, Duluth, MN and Washington, DC.

USEPA. 1997. Ecological risk assessment guidance for Superfund: process for designing and conducting ecological risk assessments. EPA-540-R-97-006. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA. 1992. Environmental Monitoring and Assessment Program: EMAP-Estuaries Virginian Province, Quality Assurance Project Plan, Contract Number 68-C1-0005.